8. TOWARD ADAPTIVE ACTION PLANS

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Management of nearshore and marine environments to support recovery of salmon and anadromous bull trout in the Puget Sound region will occur through specific actions following the strategies described in Section 7 (or similar strategies that might be identified by further, broader discussion). Given the considerable uncertainties about the effects of nearshore and marine actions (and collections of actions) on salmon and bull trout individuals, life history strategies, populations and ESUs, we believe that these actions must include – *and be designed around* – a commitment to an ongoing adaptation of management efforts through systematic learning. A commitment to adaptive management provides the best available assurance that the strategies of protecting existing habitat function and continued learning about salmon and bull trout interactions with nearshore and marine environments will preserve options for future course corrections and, over time, improve our and others' confidence that Puget Sound's nearshore and marine environments are supporting the viability of the region's salmon and bull trout.

In this section, we propose a collaborative process that Shared Strategy and/or successor institutions could lead over the next six to 18 months to develop adaptive action plans that would describe how nearshore and marine aspects of salmon recovery would be coordinated and adapted over the first 10 years of recovery effort.

We have not attempted to include a 10-year action plan in this document because our work to develop the technical basis for our recovery hypotheses and strategies has continued into April 2005. It is only in delivering this document for inclusion in Shared Strategy's June 2005 recovery plan that we feel we have sufficiently developed and presented the technical foundation around which decision-makers could discuss and move toward commitments to take specific actions following the strategic approaches introduced in Section 7. A key next step is to pursue collaborative discussions to define specific actions in each of 11 sub-basins and for the entire region.

The subsections below suggest that sub-basin collaborations proceed through a series of discussions and decisions that follow the adaptive management planning approach (and the specific guidance and terminology) suggested by the Ecosystem Management Initiative (EMI) of the University of Michigan's School of Natural Resources and Environment. (For details and definitions of terms please see EMI's web site at www.snre.umich.edu/emi/evaluation.) Consistent with the philosophy of Shared Strategy and the decision-makers' discussion mentioned in the paragraph above, EMI emphasizes a collaborative approach to planning.

8.1 Convene the right people to develop adaptive action plans – for sub-basins and for the region

We propose that work to develop adaptive action plans for nearshore and marine aspects of salmon recovery will proceed at the scale of 11 sub-basins and the entire Puget Sound region. We recommend that separate work groups be convened to develop the action plans for each of the 11 sub-basins and another entity be convened to advise Shared Strategy and/or successor entities on nearshore and marine issues of regional interest and relevance. These groups should be organized in such a way to allow them to refer issues to groups and entities working at other scales.

A first step in devising an approach to collaborative development of these action plans is to decide the scope of participation in various aspects of this work. EMI (2004) suggests that involving many groups improves credibility and ensures the broadest possible joint understanding of the situation and selected strategies. Following EMI (2004), we suggest that participants in adaptive action planning should include those who:

- have an interest in nearshore and marine aspects of salmon recovery and care about actions and adaptations that might be selected;
- are responsible for decision-making;
- have evaluation or adaptive management experience or expertise; and/or
- are good coordinators or enthusiastic leaders.

Shared Strategy and PSAT staff will continue discussions in early summer 2005 to move forward with convening groups to take on the steps below at the sub-basin and regional scale.

8.2 Describe the situation

The first stage in strategic planning and adaptive management planning is to develop a consensus view of what we are trying to achieve with nearshore and marine aspects of salmon recovery in Puget Sound (EMI 2004). We recommend that the sub-basin and regional groups that develop adaptive action plans to address nearshore and marine aspects of salmon recovery should be briefed on and familiar with the material presented in this document – especially the hypotheses stated in Section 5, the relevant sub-basin recommendations developed in Section 6, the strategies described in Section 7 – and nearshore and marine aspects of relevant watershed salmon recovery plans.

Figures 8.1 and 8.2 present two versions of a visual diagram – which EMI (2004) calls a situation map – of the relationships between the goals and strategies we presented above in Section 7. This diagram also illustrates how these strategies and goals relate to assets and threats, which are external circumstances that affect progress toward our goals. Figure 8.1 presents a simplified version of this diagram – showing only titles of strategies and general statements of goals. We hope that this version will help orient the reader to the general design of this diagram and set the stage for review of Figure 8.2, which adds

Figure 8-1. Simplified version of situation map.

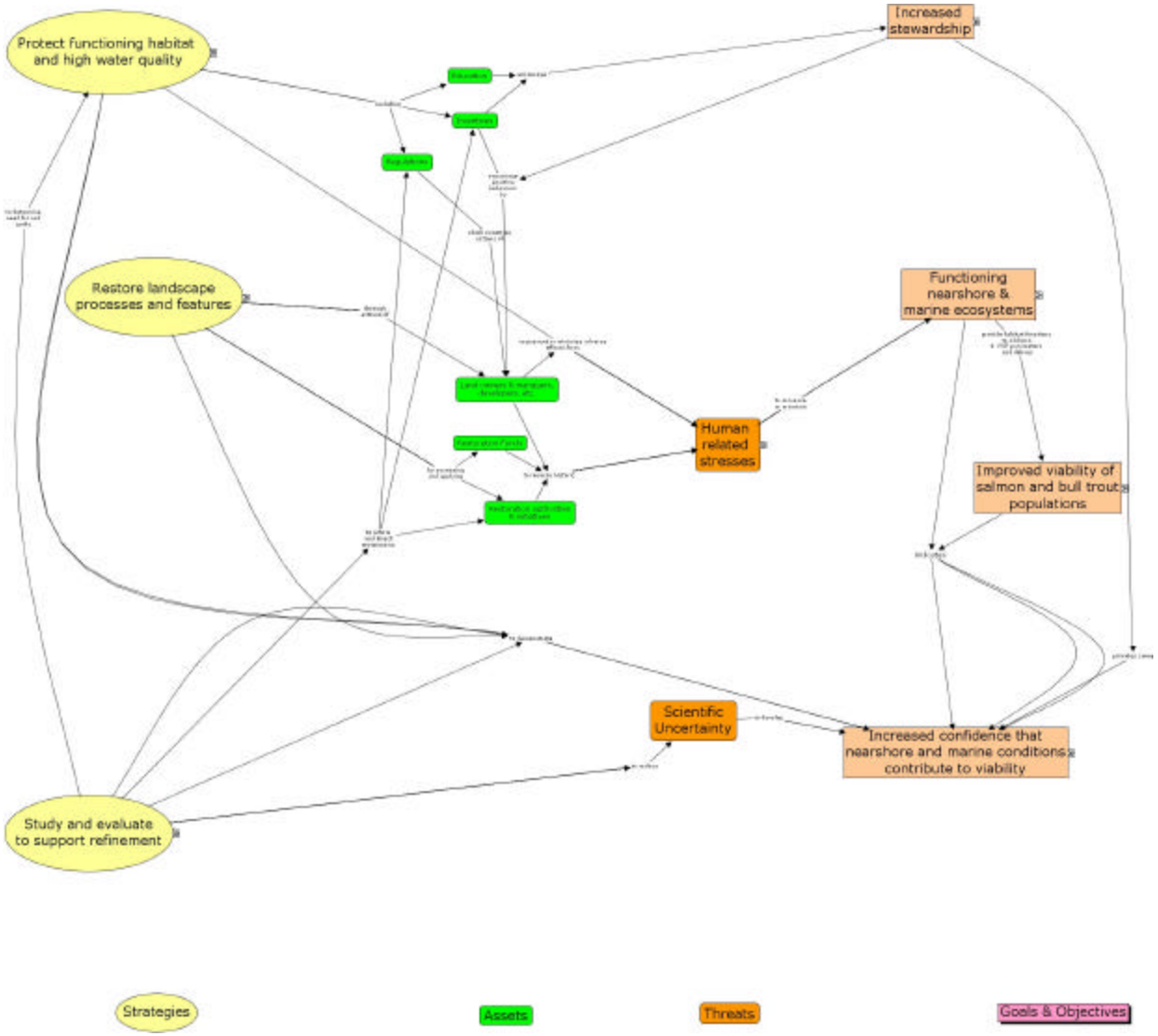
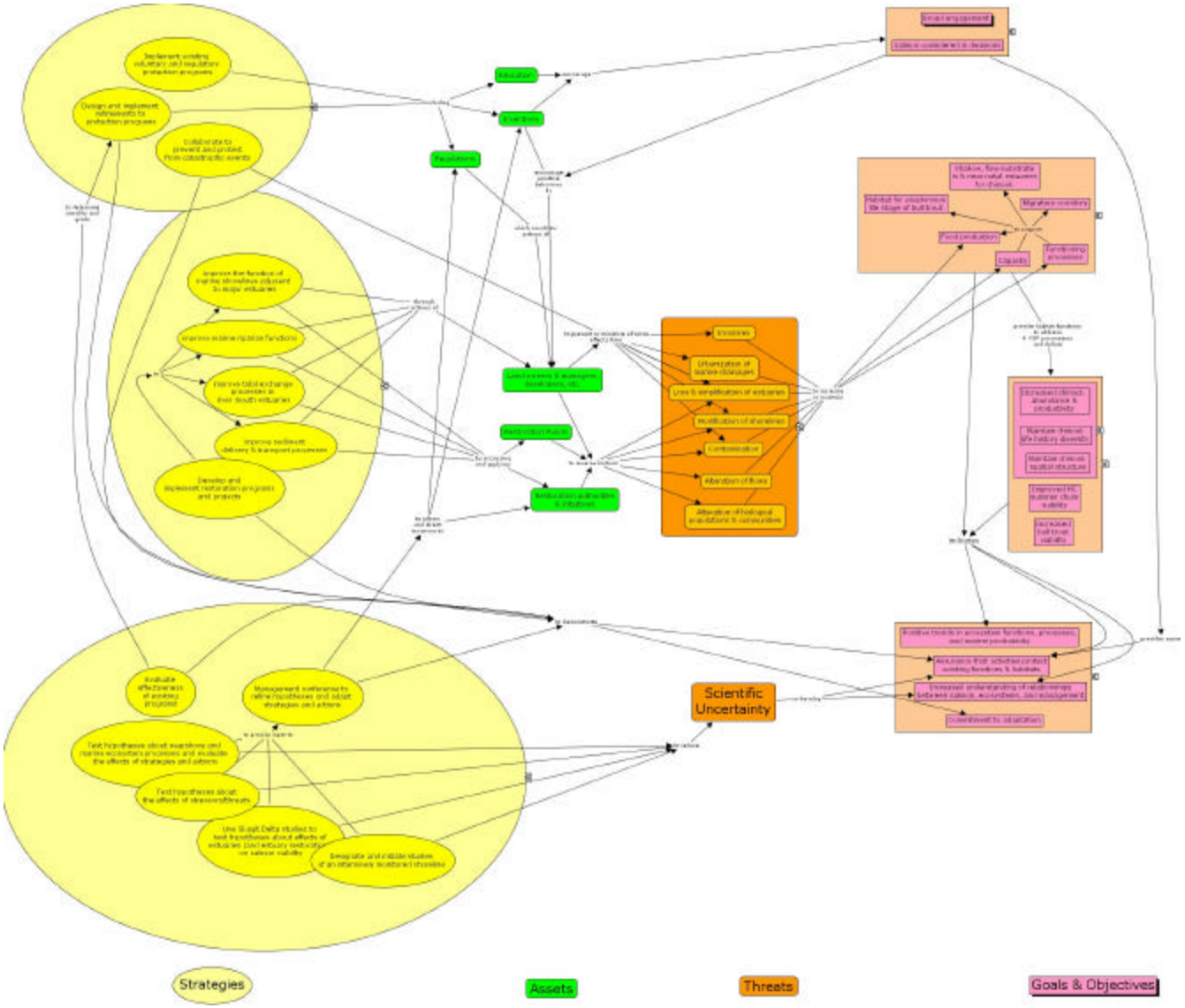


Figure 8-2. Detailed version of situation map.



detail about relationships between elements of the strategies and objectives associated with each of the goals.

Initial meeting(s) of the adaptive action planning groups could include review of Figures 8.1 and 8.2; discussion and clarification of the underlying hypotheses, bases for strategies, and key uncertainties; and suggestions of revisions to the diagrams to represent the group's consensus views of the situation they're confonting.

8.3 Initial suite of actions and framework for assessment

In this subsection, we combine the second stage of EMI's (2004) adaptive management planning process with a collaborative effort to define the suite of actions that should be implemented to support nearshore and marine aspects of salmon recovery. This stage is the heart of the adaptive action planning process in which a consensus view will be developed about:

- the actions to undertake and
- the questions to answer through evaluation of actions (and the measures needed to provide answers)

8.3.1 What do we know and want to know about implementation and effectiveness?

EMI (2004) suggests a series of brainstorm sessions of the adaptive management planning group to get started with this stage. Because we expect the adaptive action planning process to also define the suite of actions to be implemented we elaborate on EMI's suggestions for three sessions:

- How close are we to achieving our objectives? During this session(s) participants would share ideas and then work toward consensus thinking about where we are relative to our objectives for nearshore and marine ecosystems, salmon viability, knowledge, and stewardship. We foresee two outcomes from this discussion: (1) a list of possible evaluation questions that ask how close we are to our objectives and (2) consensus insights about the relative distance between the current situation and our various objectives.

- How effective are current applications of our strategies at reducing threats, using assets, and accomplishing objectives? During this session(s) participants would discuss and come to common understandings about how we know or could know whether: threats identified in Section 4 are decreasing; Section 7 protection and restoration strategies reduce threats; we capitalize on and maintain currently functioning habitats and processes, institutions, and other assets; and we understand possible unintended consequences of protection and restoration actions. Again, we foresee two outcomes from this discussion: (1) a list of possible evaluation questions that ask how effectively our strategies address

threats and leverage assets and (2) consensus insights about relative merits, uncertainties, and risks of our various strategies.

- Are actions implemented as planned? During this session(s) participants would discuss: how we might evaluate whether we are accomplishing actions; how efficiently we implement actions; and whether we have the information, staff, funding, and other resources to complete restoration, protection, and science activities. For this session we also foresee two outcomes: (1) a list of possible evaluation questions that ask how well we implement actions and (2) consensus insights about whether current efforts to advance our strategies are implemented as planned.

8.3.2 What should we do over the next 10 years?

Using the (second) outcome of the three sessions described in section 8.3.1, we suggest that the group should engage the question of: what actions seem warranted over the next 10 years? During this session(s) participants would brainstorm and then develop consensus about a list of actions that advance the strategies enumerated in Section 7 and seem reasonable given what we know about available resources and competing interests and relative priorities across the region. Possible actions to consider during this session include the recommendations listed in Section 6 and region-wide suggestions presented in Tables 8.1, 8.2, and 8.3.

8.3.3 What evaluation questions are most useful to answer?

To narrow the list of evaluation questions that will be addressed through the adaptive action plan, we suggest that the sub-basin and regional planning groups follow the priority-setting process described by EMI (2004). In this process, the planning group is first asked to identify the priority objectives and then to define the key questions that they have about that (those) objective(s) and the strategies, threats, or assets that influence that (those) objective(s). The goal of this step is to identify the most important evaluation questions that should be addressed by the adaptive management portion of the 10-year action plan. The narrowed list of evaluation questions should include items from each of the three types of questions asked in Section 8.3.1. We present a sample list of evaluation questions in Table 8.4; this table might be useful to the adaptive action planning efforts described in section 8.3.1 or in this section.

8.3.4 What will be measured to answer evaluation questions?

The next step suggested by EMI (2004), is to identify specific indicators (including comparisons to other times, other places, etc.) to provide answers to the key evaluation questions. We recommend that the adaptive action planning groups proceed to this step with the advice of the state's Monitoring Forum, the Puget Sound Ambient Monitoring Program, and/or other established entities charged with understanding and coordinating the variety of information collection efforts already underway in the region. The specific information needed to address the priority evaluation questions might be collected in

other programs or may need to be commissioned for the adaptive management purposes of regional salmon recovery. Indicator selection is complex; we recommend that specific measures be developed by iterative discussions among the action planning groups and technical and program specialists who are well versed in what is currently and/or feasibly collected and what might fit well with other approaches being developed by other groups in the region.

8.3.5 How might the evaluation information be used?

The final step in developing the initial framework for evaluation and adaptive management is to contemplate and brainstorm how indicator information might be used. This process will help participants clarify how they envision evaluation information might influence management decisions. For each selected evaluation question, the groups should be able to identify one or more possible uses of the information to help confirm that the question, and the approach to answering it, will be useful in decision-making

8.4 Logistics of adaptive management

We bundle the last two stages of the EMI (2004) evaluation approach in this final subsection, in which we propose a set of steps for a planning group to decide what information collection and analysis activities are necessary and how they will be accomplished (EMI's Stage C) and how information and analyses will be used to refine and adapt hypotheses, strategies, and actions (EMI's Stage D).

8.4.1 How will information be collected and analyzed?

Comparable to the assignment in 8.3.2, we suggest that the groups should engage the question of: what information will be collected and analyzed to evaluate recovery and support adaptations over the next 10 years? We suggest that during this discussion, the groups should seek the advice of the Monitoring Forum, PSAMP, and/or others to get informed about possible collaborations with ongoing information collection and analysis and then discuss and work toward consensus about new and existing information collection and analysis tasks to include in the 10-year action plan. As with other actions, these tasks should be reflected by commitments from implementers and/or a discussion of the conditions needed to obtain commitments.

8.4.2 How will information and analyses be used in decision-making?

Finally, the adaptive action plans will need to describe how new information will be applied to decision-making. In this stage of the process, we follow the EMI (2004) approach in suggesting that the planning groups should: (1) select trigger points, (2) decide what actions will be taken, by whom, in response to reaching trigger points, and (3) develop a plan for presenting and summarizing evaluation information.

Selection of trigger points and specification of actions that are triggered clarifies the adaptive contingencies built into the action plan: e.g., if a threshold level of bulkheading is reached, a study on the effect of bulkheads on juvenile salmon rearing will be initiated and the permitting authorities will be asked to adjust permit conditions and/or approval processes until study results are available.

We suggest that planning groups clearly establish trigger points, courses of action, and responsibilities for adaptation in an adaptive management plan. This plan should also describe the institutional capabilities needed and deployed to ensure that information and analyses are developed, triggers are checked, and adaptive actions are taken.

We suggest the following types of triggers and adaptations be included in the adaptive management portion of the 10-year action plans:

- Update assessment of conditions/status (what reports, by whom & when?)
- Refine hypotheses (whose hypotheses, reviewed how, when?)
- Review and, if appropriate, revise strategies (who & when?)
- Devise and implement new or modified actions (including a new monitoring and adaptive management plan) (who & when?)
- Document adaptations and the adaptive process (investments in monitoring, evaluation, planning) (what report, by whom & when?)

Table 8.1: Possible regional protection actions for a 10-year action plan

Recommended action	Source
Ecology ensures that activities subject to state authorities of the Shoreline Management Act are protective of habitat functions for salmon and bull trout by: (1) reviewing shoreline permit applications; (2) permitting and approving appropriate activities and programs; and (3) facilitating compliance with state laws and policies through education, technical assistance, and enforcement actions.	NPG & PSAT Mgmt. Team discussion
WDFW ensures that activities subject to state authorities of the Hydraulic Code are proctective of habitat functions for salmon and bull trout by: (1) reviewing applications for hydraulic project approvals; (2) granting approvals; and (3) facilitating compliance with state laws and policies through education, technical assistance, and enforcement actions.	NPG & PSAT Mgmt. Team discussion
State agencies share example language of local regulations, ordinances, and policies	NPG & PSAT Mgmt. Team discussion
State agencies provide continued guidance on how to integrate shoreline and growth management, including examples for local governments on how to effectively link CAO and SMP updates with salmon recovery	NPG & PSAT Mgmt. Team discussion
State agencies develop and provide guidance to document sources of best available science for nearshore recovery	NPG & PSAT Mgmt. Team discussion
State agencies develop and follow protocols for review of and comment on local policies, plans, ordinances, and other program elements that address growth and shoreline management authorities	NPG & PSAT Mgmt. Team discussion
State agencies review and comment on local policies, programs, ordinances, and regulations to ensure state's expectations for growth and shoreline management (as expressed in statutes and rules) regarding protection of existing functions and consideration of salmonids and bull trout. Comment should recognize the responsibility of local authorities to achieve the balances called for in the state's growth and shoreline management statutes, rules, and policies.	NPG & PSAT Mgmt. Team discussion
NGOs and PSNERP share information about key nearshore and marine habitat features and opportunities for habitat protection and improvement identified through their assessment activities	NPG & PSAT Mgmt. Team discussion
NGOs and state agencies collaborate with local and tribal governments and watershed and salmon habitat groups to devise a coordinated approach to identifying key habitat features, landscapes, and processes at greatest risk for development and designing protection efforts – regulatory and voluntary – to focus in those areas	NPG & PSAT Mgmt. Team discussion
NGOs and governments develop and implement strategies to focus voluntary conservation efforts and funds on the protection of habitats and processes at risk that are not adequately protected by regulations because of landownership or development patterns.	NPG & PSAT Mgmt. Team discussion
Conservation Commission continues targeting of technical assistance and incentive payments to activities to support salmon recovery	NPG & PSAT Mgmt. Team discussion
DNR and leaseholders continue to develop and implement aquatic resource protections through conservation leasing	NPG & PSAT Mgmt. Team discussion
State & federal agencies and NGOs provide funding to support public and private education and outreach programs focused on marine resources and development practices.	NPG & PSAT Mgmt. Team discussion
State & federal agencies and NGOs develop and distribute educational materials targeted to landowners and their opportunities to protect and improve habitat conditions to support salmon recovery.	NPG & PSAT Mgmt. Team discussion
State salmon recovery office facilitates discussion regarding extending or amending Public Benefit Rating System authorities and/or applicability to marine settings.	NPG & PSAT Mgmt. Team discussion
State salmon recovery office facilitates legal and policy discussion to support lot consolidation	NPG & PSAT Mgmt. Team discussion

Recommended action	Source
Amend GMA and SMA to describe the role of the local programs and regulations in salmon recovery and to require implementation that is protective of salmon	NPG comments on Sept. 2004 draft
Encourage and review protection actions to ensure that balance of other goals/interests is incorporated into the decision making process	NPG comments on Sept. 2004 draft
Develop, advocate, and implement SMPs, CAOs, and other regulations that protect and restore shoreline with a focus of the highest levels of protection available in local shoreline master programs and/or critical areas ordinances on targets identified in sub-basin evaluations	NPG comments on Sept. 2004 draft
Provide funds to support local governments' regulation, including enforcement, to protect neashore (not just counties)	NPG comments on Sept. 2004 draft
Develop and provide model policies AND guidance on marine shorelines	NPG comments on Sept. 2004 draft
Focus acquisition on sub-standard lots that contain habitat/function priorities	NPG comments on Sept. 2004 draft
Develop and assist in implementation of non-regulatory approaches to local management of shoreline development and growth –e.g., technical assistance to provide incentives for landowners to restore shorelines during redevelopment activities	NPG comments on Sept. 2004 draft
Implement mini-grant and partnership programs as cost-share tools	NPG comments on Sept. 2004 draft
Coordinate mitigation required under the ESA, CWA, SMA, and the Hydraulics Code, etc. to steer mitigation strategically toward the highest needs of the system as opposed to the needs of a site	NPG comments on Sept. 2004 draft
Move houses (and similar actions) by any approaches from in the land use "toolbox" -- incentives or regulations	NPG comments on Sept. 2004 draft
Use new information on the presence and distribution of juvenile salmon to review and modify shoreline construction timing and practices throughout the Puget Sound.	NPG comments on Sept. 2004 draft
Ensure enforcement by regulatory agencies	NPG comments on Sept. 2004 draft
Develop clear and numerical guidelines that direct what is (not) allowed with new or re-development	NPG comments on Sept. 2004 draft
Broaden local stormwater management programs to include monitoring and adaptive management, NPDES permits, funding for monitoring, and retrofits	NPG comments on Sept. 2004 draft
Develop and coordinate a public outreach plan, including technical assistance to private property owners and education of children and adults about salmon life cycles and ways in which people can minimize their impacts to salmon	NPG comments on Sept. 2004 draft
Develop clear goals that balance specific GMA and planning targets for economic, transportation and housing development with specific targets for spatial habitat integrity and connectivity	NPG comments on Sept. 2004 draft
Consider wastewater reclamation and reuse retrofits for Bellingham Bay and Semiahmoo Spit wastewater discharges	South Georgia Strait evaluation

Table 8.2: Possible regional restoration actions for a 10-year action plan

Recommended action	Source
Encourage SRFB and lead entities to integrate sub-basin recommendations for protection and restoration in their funding decisions and strategies.	NPG comments on Sept. 2004 draft
Implement the Bellingham Bay habitat plan; targeted restoration in Bellingham Bay – per the recommendations of the Bellingham Bay pilot project.	South Georgia Strait evaluation
Restore natural sediment delivery processes in target areas (e.g., near Cherry Point) by removing shoreline armoring and/or retrofitting facilities (e.g., pier) that might disrupt sediment passage	South Georgia Strait evaluation
Begin restoration with public lands	NPG comments on Sept. 2004 draft
Restore the Skagit, Snohomish, Stilliguamish and Nooksack river deltas	NPG comments on Sept. 2004 draft
Encourage and review restoration strategies and actions to ensure that balance of other goals and interests is incorporated into the decision making process	NPG comments on Sept. 2004 draft
Develop and provide substantial incentives to restore key habitats in key places – use incentives to develop opportunities consistent with ESU and sub-basin needs	NPG comments on Sept. 2004 draft
Encourage use of SMPs as an incremental restoration tool – support local jurisdiction efforts to: coordinate salmon recovery planning into broader shoreline restoration plans; use shoreline restoration plans to inform local SMP updates, including establishing shoreline designations, zoning, and shoreline development regulations; develop non-regulatory programs to implement shoreline restoration plans	NPG comments on Sept. 2004 draft
Develop strategic approach to restoration at local and regional scales to optimize allocation of resources and time	NPG comments on Sept. 2004 draft
Facilitate local restoration of nearshore, not just estuaries	NPG comments on Sept. 2004 draft
Reduce or eliminate permit fees for restoration and enhancement projects	NPG comments on Sept. 2004 draft
SRFB, ALEA, Puget Sound & Adjacent Waters, NOAA Community Based Restoration and other state and federal programs fund and otherwise facilitate projects to increase the tidal prism in natal deltas and select pocket estuaries by removing road constrictions (e.g., I-5, Hwy 101, local shoreline roads)	NPG & PSAT Mgmt. Team discussion

Table 8.3: Possible regional research, monitoring, and evaluation actions for a 10-year action plan

Recommended action	Source
Apply increased knowledge towards decisions and actions	NPG comments on Sept. 2004 draft
Develop quantified target population sizes and numbers of juveniles by sub-basin – adapt plans based on these targets	NPG comments on Sept. 2004 draft
Improve documentation of how the San Juan region is used by migrating salmon (juvenile and adult).	NPG comments on Sept. 2004 draft
Develop more complete information on forage fish spawning & life-history and drift cell protections; comprehensive forage fish spawning surveys may also be a priority in all sub-basins.	NPG comments on Sept. 2004 draft
Develop estimates of costs for specific action items	NPG comments on Sept. 2004 draft
Partner and integrate local environmental monitoring programs with regional programs	NPG comments on Sept. 2004 draft
Fund key research into the scientific basis, per the standards of "best available science," for appropriate marine shoreline buffers and setbacks around the Puget Sound basin	NPG comments on Sept. 2004 draft
Continue studies of salmon use of various nearshore environments, e.g., Skagit System Coop., salmon beaches	NPG comments on Sept. 2004 draft
Examine status of delta fry and fry migrants in central Puget Sound populations	Technical comments on Sept. 2004 draft
Develop models for estuary reconnection that will support access to intertidal wetlands in the Lummi delta for delta fry life history type that may have been part of the historic population	South Georgia Strait evaluation
Conduct studies to better understand the role of eelgrass detritus export to other sub-basins and model expected changes to eelgrass cover and distribution as a result of various delta reconnection scenarios.	Sub-basin evaluations
Research is needed to understand metrics of eelgrass patchiness important to Hood Canal/Eastern Strait of Juan de Fuca Summer chum	Sub-basin evaluations
Attend to food webs (e.g., sufficient bait fish and krill to support migrants and residents; beyond spawning beaches, to stock recovery)	Sub-basin evaluations
Research the geologic and oceanographic processes that determine upwelling of nutrients, primary and secondary productivity that support forage fish and salmon.	Sub-basin evaluations
Examine the role of freshwater outflow in driving deep estuarine circulation need to be better understood.	Sub-basin evaluations
Develop and use ecosystem models to understand causes of Hood Canal dissolved oxygen problems and evaluate potential corrective measures	Science investment neede to accomplish a recommendation in a sub-basin evaluation

Table 8.4. Possible Evaluation Questions

Are region-wide protection actions implemented? Efficiently? What resources are used or needed?
Are local protection actions implemented? Efficiently? What resources are used or needed?
Are improvement projects implemented as planned? Efficiently? What resources are used or needed?
Are region-wide protection actions effective at maintaining current functions? Are there unintended consequences on salmon viability?
Are local regulatory protections effective at maintaining current functions? Are there unintended consequences on salmon viability? • What is the rate of habitat loss in various jurisdictions? • Group jurisdictions by type of approach • Define levels of "on paper" protection and test whether on the ground results correspond to the "on paper" level
Are local voluntary and incentive-based protection efforts effective at maintaining current functions? Are there unintended consequences on salmon viability? • Do properties in protected status deliver different habitat functions (now & projected into future) than do un-protected properties? • What are the costs per unit (acre, mile) of various programs and (combined with above) what is the cost-effectiveness of various programs?
Are process and habitat improvements effective?
What relationships among salmon/bull trout and habitat protection and restoration are evident at intensively monitored areas (Skagit delta already designated; shoreline to be designated)? • How do competition and predation by hatchery fish affect the viability of wild salmon? • Are any PS salmon capacity limited in nearshore or early marine life stages? • Do restoration, rehabilitation, or substation efforts have detectable effects on measures of salmon viability? Are these the hypothesized effects? • Do the strategies and actions focused on Chinook (and chum?) recovery accomplish ecosystem benefits and support recovery of other species?
What do coordinated research programs tell us about relationships among salmon/bull trout and nearshore or marine habitats, processes, and/or stressors? • Nearshore ecosystem processes and the effects of restoration (CHIPS, UW PRISM/nearPRISM) • Are any PS salmon capacity limited in nearshore or early marine life stages? (UW and/or NOAA NWFSC) • Do the strategies and actions focused on Chinook (and chum?) recovery accomplish ecosystem benefits and support recovery of other species? • How do competition and predation by hatchery fish affect the viability of wild salmon? (NOAA NWFSC) • Ecotoxicology (contaminant effects) (NOAA NWFSC with USGS divisions)